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occasionally have small companions of opposite polarity, which play such a minor and sporadic part in the group that they are disregarded in the classification.

In the tabulation of the polarities an  $x$  indicates that the group was photographed or seen on that date, but that no polarity observation was made of it. The direct photographs taken with the 60-foot tower telescope are available for these additional data. At the foot of each column is given the number of groups observed that day. When the column for any day is blank, and a dash is used instead of the number of groups, it indicates that no observations were made on that date. If the Sun was observed but no spots were visible, a zero will be found at the foot of the daily column.

Since the minimum of 1913, *unipolar* groups and the preceding spots of *bipolar* groups in the northern hemisphere have had a polarity like that of a north-seeking pole, called positive in this summary. In the southern hemisphere similar spots are of opposite polarity, and are called negative. There are very few exceptions to this rule, and unless the contrary is noted it is to be understood that the group is "regular" in polarity.

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#### SUN-SPOT ACTIVITY DURING 1921

During the present year 140 sun-spot groups have been observed at Mount Wilson, 73 north and 67 south of the solar equator. Compared with the 295 groups observed in 1919 and the 168 in 1920, this indicates a less rapid decrease in spot activity than that hitherto characteristic of this cycle. The movement of the spot zones toward the Sun's equator has continued at the normal rate. The average distance of all spots from the equator was  $10^{\circ}.0$ , the average latitude in both hemispheres being the same.

The greatest number of separate groups observed on a single day was eight, on July 2. There were 31 days on which no spots were visible, a decided increase from the eight spotless days of 1920. Most of these spotless days were in the last five months of the year, nine of them being in the month of November. During these months one hemisphere of the Sun remained practically free from spots, so that when the solar rotation

brought that half of the Sun into view no spots would be seen for several days. The record for December is somewhat uncertain, on account of the long stormy period during the last half of the month. As observations were impossible on eleven days, the mean number of spot groups observed daily during December has smaller weight as a measure of spot activity than that for the other months.

Solar observations were made on 320 days; hence the accompanying table gives a very complete record of the spot activity for the year.

| MEAN NUMBER OF GROUPS OBSERVED DAILY |      |      |                        |      |      |
|--------------------------------------|------|------|------------------------|------|------|
|                                      | 1920 | 1921 |                        | 1920 | 1921 |
| January . . . . .                    | 3.0  | 2.7  | July . . . . .         | 3.1  | 3.5  |
| February . . . . .                   | 4.4  | 2.6  | August . . . . .       | 2.1  | 2.0  |
| March . . . . .                      | 3.7  | 2.5  | September . . . . .    | 2.1  | 1.8  |
| April . . . . .                      | 2.0  | 2.8  | October . . . . .      | 4.2  | 1.8  |
| May . . . . .                        | 3.2  | 1.4  | November . . . . .     | 2.3  | 1.4  |
| June . . . . .                       | 3.5  | 3.0  | December . . . . .     | 3.4  | 1.8  |
|                                      |      |      | Yearly average . . . . | 3.1  | 2.3  |

The most notable group of the year was No. 1842, which crossed the central meridian on May 14 and was associated with remarkable magnetic storms and auroral displays. This group, which was very complex magnetically, was situated exactly on the solar equator. Several large regular spots which appeared during the year were approximately as large as the largest observed last year. There will undoubtedly be more such spots during the next year or two before the minimum of spot activity is reached.

SETH B. NICHOLSON.